

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Carbon Black Plant Designer MCP

Build precise furnace black production plant specifications.

Carbon Black Plant Designer MCP provides the engineering calculations needed to design furnace black production facilities. Your AI client uses this MCP to determine reactor dimensions, thermal profiles, quench system scales, and filtration requirements based on your specific feedstock, capacity, and product grade needs.

A+ Quality Score 100/100

carbon-black

furnace-black

plant-design

chemical-engineering

manufacturing



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Carbon Black Plant Designer MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting of furnace black plant design. Instead of manually calculating every variable, you give your AI client the feedstock type, desired capacity, and product grade. It then runs the math to size your equipment. You'll use it to define the primary reaction furnace dimensions and thermal parameters through `get_reactor_specifications`. From there, you can size the cooling equipment using `get_quench_system_design` and determine the necessary filtration hardware with `get_collection_system_requirements`. Once the individual components are set, `get_plant_summary` gives you a full view of the design's complexity and feasibility. It's a direct way to move from high-level requirements to a technical blueprint for a production facility.

Core Capabilities

01 — Reactor Sizing

Your agent calculates furnace dimensions and thermal profiles.

02 — Quench Design

Your agent determines cooling equipment scale and flow requirements.

03 — Filtration Planning

Your agent defines the hardware needed for product recovery.

04 — Feasibility Checks

Your agent evaluates plant complexity and equipment mass based on capacity.

05 — Design Summarization

Your agent pulls all component specs into a single consolidated overview.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/carbon-black-plant-designer — connect your AI agent in three steps.

- 01 Connect your MCP-compatible client to the Vinkius platform.
- 02 Provide your agent with feedstock, capacity, and product grade data.
- 03 The agent calls the specific tools to calculate reactor, quench, and filtration specs.
- 04 Review the consolidated plant summary to verify the design.

Connect your AI client to Vinkius and start running engineering calculations immediately.

Built For

This MCP is built for engineers working in chemical manufacturing and plant design.

Chemical Engineers

They use the MCP to generate technical specifications for furnace black processes.

Plant Designers

They use the tool to size equipment and check design feasibility.

Process Engineers

They use the calculations to define thermal and filtration requirements.

What Changes When You Connect

- 01 Calculates reactor thermal profiles based on specific product grades.
- 02 Sizes quench and cooling systems using capacity-driven math.

-
- | | |
|-------|---|
| 03 | Determines filtration hardware requirements for product recovery. |
| <hr/> | |
| 04 | Provides a consolidated design summary to check feasibility. |
| <hr/> | |
-

Real-World Applications

Initial Plant Sizing

You provide feedstock and capacity to get a baseline for reactor and quench equipment.

Product Grade Optimization

You adjust the product grade to see how it changes filtration and reactor requirements.

Feasibility Studies

You check if a specific capacity and feedstock combination is technically viable.

Equipment Specification

You get the exact dimensions and thermal parameters needed for furnace procurement.

Patterns to Avoid

Guessing equipment dimensions

❌ AVOID

You tell your agent to just estimate how big the furnace should be based on a hunch.

✓ INSTEAD

Provide the feedstock type and desired capacity, then use `get_reactor_specifications` to get the exact dimensions and thermal parameters.

Ignoring cooling requirements

❌ AVOID

You design the reactor but forget to account for how much cooling the quench stage needs.

✓ INSTEAD

Run `get_quench_system_design` after sizing the reactor to ensure your cooling equipment scale matches your capacity.

Skipping the final review

❌ AVOID

You assume all individual component specs work together without checking the total plant complexity.

✓ INSTEAD

Always run `get_plant_summary` once you have specified your components to verify the design's overall feasibility.

The Right Fit

Chemical and process engineers should connect this MCP if they need to move from high-level requirements to technical blueprints. If you are just looking for general industry trends or non-technical estimates, this tool isn't for you. The decision depends on whether you need specific, math-driven equipment dimensions for procurement or design.

Carbon Black Plant Designer 4 Tools

These tools handle the mathematical heavy lifting for furnace black plant design, from reactor sizing to final feasibility checks.

#	TOOL	DESCRIPTION
01	get_collection_system_requirements	This tool defines the specific filtration and separation hardware needed to recover your product.
02	get_plant_summary	This tool provides a consolidated overview of the entire plant design once components are specified.
03	get_quench_system_design	This tool calculates the cooling requirements and the necessary equipment scale for the quench stage.
04	get_reactor_specifications	This tool determines the required dimensions and thermal parameters for the primary reaction furnace.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U Design a plant using oil feedstock with a capacity of 5000 units for grade N330.



The design for an N330 grade plant using oil feedstock at 5000 units capacity requires a reactor volume of 450m³, an operating temperature of 1650°C, and a spray-type quench system with a flow rate of 1200 L/min.

U What are the filtration requirements for N660 grade at 2000 capacity?



For N660 grade at 2000 capacity, the required filter surface area is 850m², with an expected collection efficiency of 99.2% and a system pressure drop of 15 kPa.

U Is it feasible to design a gas-based plant for N550 with 10000 capacity?



The design is feasible. The total estimated equipment mass is 12500kg with a design complexity score of 7.5/10.

Frequently Asked Questions

01 What kind of plants can I design with this MCP?

This MCP is specifically for designing carbon black production plants using the furnace black process.

02 Which AI clients can use this tool?

You can use this MCP with any compatible client like Claude, Cursor, Windsurf, or VS Code.

03 Can I check if a design is feasible?

Yes, you can use the plant summary tool to check the feasibility and complexity of your design based on your inputs.

04 Does this MCP handle filtration requirements?

Yes, the collection system tool defines the filtration and separation hardware needed to recover the product.

05 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP so it is ready to use as soon as you connect your client.

06 What parameters are required for a plant design?

You must provide the feedstock type (e.g., tar, oil, gas), the target production capacity, and the specific carbon black product grade (e.g., N330, N550).

07 Can I check if my design is physically possible?

Yes, by using the `get\_plant\_summary` tool, the system evaluates if the reactor and quench systems can be scaled to meet your specific capacity and grade requirements.

08 How does the tool handle different product grades?

The tools adjust calculations for reactor residence time, quench cooling rates, and filter surface area based on the specific particle morphology requirements of the chosen grade.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"carbon-black-plant-designer": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  Ask ChatGPT 
-  Ask Claude 
-  Ask Perplexity 
-  Ask Gemini 
-  Ask Grok 

READY TO CONNECT

Carbon Black Plant Designer is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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